Title	Studies on the Swelling of Bentonite. (III)
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Citation	京都大学化学研究所報告 (1950), 20: 49-49
Issue Date	1950-03-20
URL	http://hdl.handle.net/2433/74062
Right	
Type	Departmental Bulletin Paper
Textversion	publisher

11. Studies on the Swelling of Bentonite. (III)

Sozaburo Ono and *Takehiko Watanabe.*

The effects of autoclaving upon the degree of swelling of Japanese bentonites and their heat-treated samples were examined. The thermal dehydration curves of these samples were also obtained. Comparing these results with those of the preceding two reports (This Report, **17**, 101; **13**, 112 (1949)), the following conclusions were obtained.

1) By the autoclaving as well as the irradiation of ultrasonic waves, the bentonite, whose swelling has been markedly reduced in degree by heat-treatment, can be recovered in the degree of swelling. These effects may be attributed to the addition of a certain amount of water in some parts of the structure of bentonite whose decrease of swelling had been caused by the dehydration due to the previous heat-treatment.

2) The autoclaving exerts a favourable influence on the effect of the succeeding ultrasonic wave treatment.

3) The swelling capacity of bontonite may be due to the existence of some parts of bentonite where dehydration takes place in the two temperature ranges 450~800°C and 180~450°C. And the former determines whether the bentonite exhibits the swelling capacity or not.

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12. On the Reduction of Tungsten Oxide with Hydrogen (III)

Reduction Velocity of Tungsten Oxide and Oxidation Velocity of Reduced Powder Measured by a Spring Balance.

Nobuji Sasaki and *Ryozo Ueda.*

The velecties of reduction of variously prepared pure tungsten oxides by flowing hydrogen at various temperatures and the velocities of oxidation of metallic powder thus formed by air at room temperature, were measured by means of a sensitive quartz fibre spring balance placed in the reaction tube. The higher the reduction temperature and the finer the oxide the more rapidly the trioxide could be reduced, but not below 400°C. Neither could the ammonium paratungstate be reduced at 400°C by hydrogen, but completely decomposed to trioxide without being reduced at all. The finer oxide (particle size: about 0.01μ) could be completely reduced to metal in 3 hrs. at as low as 480°C, while the coarse oxide (particle size: about 3μ) only to about 40% in 3 hrs. at 500°C. When reduced below 700°C, the products are liable to oxidation by air at room temperature. The velocity and extent of reoxi-